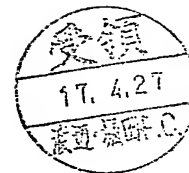


PATENT COOPERATION TREATY



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:
WATANABE, Isamu

GOWA Nishi-Shinjuku
4F, 5-8, Nishi-Shinjuku
7-chome, Shinjuku-ku, Tokyo
1600023 Japan

PCT
WRITTEN OPINION OF THE
INTERNATIONAL PRELIMINARY
EXAMINING AUTHORITY
(PCT Rule 66)

Date of mailing
(day/month/year)

26. 4. 2005

Applicant's or agent's file reference
PEB383

REPLY DUE

within 2 months from
the above date of mailing

International application No.

PCT/JP2004/005637

International filing date (day/month/year)

20. 04. 2004

Priority date (day/month/year)

22. 04. 2003

International Patent Classification (IPC) or both national classification and IPC

Int.Cl.⁷ H01L21/3205, 21/304, 21/306

Applicant

EBARA CORPORATION

1. ☒ The written opinion established by the International Searching Authority:

☒ is ☐ is not

considered to be a written opinion of the International Preliminary Examining Authority.

2. This second (first, etc.) opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(e).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary report on patentability
(Chapter II of the PCT) must be established according to Rule 69.2 is: 22. 08. 2005

Name and mailing address of the IPEA/JP

Japan Patent Office

3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan

Authorized officer

TAKASHI WATAHIKI

Telephone No. +81-3-3581-1101 Ext. 3498

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WRITTEN OPINION OF THE
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

International application No.

PCT/JP2004/005637

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This opinion is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this opinion has been established on the basis of (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

- ☐ the international application as originally filed/furnished

- ☒ the description:
pages 1-136 as originally filed/furnished
pages _____ received by this Authority on _____
pages _____ received by this Authority on _____

- ☒ the claims:
Nos. 2, 4-28, 30, 31, 33, 34, 36, 37, 41 as originally filed/furnished
Nos. _____ as amended (together with any statement) under Article 19
Nos. 1, 3, 29, 32, 38, 40 received by this Authority on 18.11.2004
Nos. _____ received by this Authority on _____

- ☒ the drawings:
sheets/figs 1-51 as originally filed/furnished
sheets/figs _____ received by this Authority on _____
sheets/figs _____ received by this Authority on _____

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☒ the claims, Nos. 35, 39
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

4. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to sequence listing (specify): _____

**WRITTEN OPINION OF THE
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY**

International application No.

PCT/JP2004/005637

Box No. V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-28, 33, 36, 37, 40, 41	YES
	Claims	29, 30, 31, 32, 34, 38	NO
Inventive step (IS)	Claims	1-28, 40, 41	YES
	Claims	29-34, 36-38	NO
Industrial applicability (IA)	Claims	1-34, 36-38, 40, 41	YES
	Claims		NO

2. Citations and explanations

D1:JP 2002-353223 A (SONY CORPORATION) 2002.12.06

D2:JP 2001-144050 A (HITACHI CHEMICAL CO., LTD.) 2001.05.25

D3:JP 10-214834 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD) 1998.08.11

D4:JP 2001-284297 A (SONY CORPORATION) 2001.10.12

D5:EP 001278241 A2 (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD) 2003.01.22

(The document D1, D2 and D4 was not cited in the international search report.)

[Claims 29-31, 33, 34, 38]

The subject matter of claims 29-31, 33, 34, 38 does not appear to be novel and to involve an inventive step with respect to D1.

"Barrier metal 4" and "copper interconnect layer 6" in D1 correspond to "the interconnect material" in the invention in claim 29.

[Claims 29-31, 33, 34, 36, 37]

The subject matter of claims 29-31, 33, 34, 36, 37 does not appear to be novel and to involve an inventive step with respect to D2.

[Claim 32]

The subject matter of claim 32 does not appear to involve an inventive step with respect to D1, D2.

The subject matter of claim 32 is a well-known technology.

[Claim 38]

The subject matter of claim 38 does not appear to involve an inventive step with respect to D3, D4.

D4 (See[0011]) discloses that low pressure polish can prevent a defect.

Therefore, in the invention in D3, the person skilled in the art would easily apply low pressure polishing in the second polishing step.

[Claims 29-34, 36, 37]

The subject matter of claims 29-34, 36, 37 does not appear to involve an inventive step with respect to D4, D5.

In D5, the second stage of the CMP performed with high pressure enables high polishing rate.

On the other hand, D4 (See[0011]) discloses that high pressure polishing enables high polishing rate but it causes defect.

Therefore, in the invention in D5, performing low pressure polishing in the latter phase of the second stage of the CMP, in consideration of prevention of a defect, a person skilled in the art can do it easily.

WRITTEN OPINION OF THE
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

International application No.

PCT/JP2004/005637

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box No.V, item2

[Claims 1-28,40,41]

The subject matter of claims 1-28,40,41 are neither disclosed in any of the documents cited in the ISR nor obvious to a person skilled in the art.

ATTENTION

Forms and Preparation Points for Documents to be Submitted

Forms for a written reply and a written amendment shall be prepared in conformity to Article 62 (Form 23bis) and Article 31 (Form 15bis) of Enforcement Regulations of Law Concerning the International Application of the Patent Cooperation Treaty and Related Matters.

[Remarks]

1. The paper sheet used is set to Row A, No. 4 (horizontal writing 21cm, 29.7cm) of the Japanese Industrial Standards; only one side of a flexible, strong, smooth, lusterless, and durable paper sheet with no fold is used with its shorter side at the top; and unnecessary characters, signs, frame lines, ruled lines, etc. shall not be written on this paper.
2. The paper shall be free of creases and tears.
3. Margins shall be set to at least 2cm at the upper edge, the right edge, and the bottom edge of the paper sheet, and 2.5cm at the left edge. In principle, the margins shall not exceed 4cm at the upper edge and the left edge, or 3cm at the right edge and the bottom edge. In these cases, the margins are left completely blank. The document number (provided it is described in the request) may be added in the margin corner of the upper edge and within 1.5cm of the upper edge.
4. The written reply shall be a typed or printed manuscript so that an arbitrary number of copies may be directly made by photograph, electrostatic method, photographic offset, or microfilm.
5. In all the paper sheets of the written reply, serial numbers starting from 1 in Arabic numerals shall be added in the center of the top or bottom edge of the paper sheet (except for the margin parts).
6. In cases of a typed manuscript, the space between the lines shall be set to at least 5mm. In case of using Roman letters in Remarks 11 and 14, the width shall be set to 1.5 letters.
7. Items mentioned shall be written in characters of No. 4 type (Roman letters used for Remarks 11 and 14 are set to not less than 0.21cm in height in capital letters), wherein the color used shall be dark and non-fading, and the characters shall fulfill the requirements prescribed in Remark 4.
8. In the column "Indication of International Application," where an applicant has already received the notification of the international application number from the Patent Office, the number shall be described in such a manner as "PCT/JP ○○○○/○○○○○○," where the applicant has not yet received the notification of the international application number, the date of submitting the international application shall be described in the order of date, month and year in such a manner as "international application submitted on ○○.○○.○○○○", and the document number (provided it is described in the request) shall be also described therein.
9. The "Name of Applicant" shall be described as the full name in the order of family name and first name in the case of an individual person; in the case of a juridical body, the name shall be described.
10. The "Address" shall be described in detail such as "Japan, prefecture, county, village, major article, minor article, plot number, and house number" and the postal code shall be also stated.
11. The transliteration of the name and the address of the applicant or their translation into English shall be also added thereto using Roman letters.
12. In the column "Nationality," the name of the country of the applicant or the representative shall be described.
13. In the column "Address," the name of the country in which the applicant or the representative resides shall be described.
14. In the case of describing the name of a country, the name of the country designated by the Commissioner shall be written in Japanese and English.
15. In the column "Representative," the name of the representative shall be described and the applicable one from among "lawyer," "patent attorney," and "legal representative" shall be described before the name of the representative.
16. Where a representative is stated, the seal of the applicant is not necessary; if there is no representative, the column "Representative" need not be provided.
17. In each paper sheet, erasure, correction, overwriting, and inserted lines are not permitted in principle.
18. The paper sheets for the written reply shall be filed with, for example, a clip so as to be easily separated or re-filed.
19. In the "Address," only one address of each applicant, representative, attorney, or sub-attorney shall be described.
20. In the column "Sub-Attorney," the name of the sub-attorney shall be described and the applicable name from among "lawyer" or "patent attorney" shall be described before the name of the sub-attorney.
21. Where a sub-attorney is stated, the seal of an attorney is not necessary; if there is no sub-attorney, the column "Sub-attorney" need not be provided.
22. The Christian Era or Gregorian Calendar shall be used for the date. Figures

of the day, figures of the month, and last two figures of the year shall be expressed in Arabic numerals respectively in this order, and a period shall be added after the figures of the day and the month (for example, March 30th, 2004 shall be written as "30.03.2004"). When using another era or calendar, the Christian Era or Gregorian Calendar shall be added thereto.

[Remarks]

Form 23bis (Related to Article 62)

REPLY (ARGUMENT)

To: Examiner of the Patent Office

1. Identification of the International Application
2. Applicant (Common Representative)

Name: _____ Signature _____ (印)

Address: _____

Country of Nationality: _____

Country of residence: _____

3. Agent

Name: _____ Signature _____ (印)

Address: _____

4. Date of Notification

5. Subject Matter of Reply (Argument)

6. List of Attached Documents

1. In case an amendment is made pursuant to the order in the provisions of Article 6 of the Patent Law, the title shall be set to "AMENDMENT (amendment based upon the order in the provisions of Article 6 of said Law)"; in case an amendment is made pursuant to the provisions of Article 11 of said Law, the title shall be set to "AMENDMENT (amendment based upon the provisions of Article 11 of said Law)"; in case an amendment is made pursuant to the order in the provisions of Item 2 of Article 1 of the Patent Law Enforcement Order, the title shall be set to "AMENDMENT (amendment based upon the order in the provisions of Item 2 of Article 1 of said Order)"; in case an amendment is made pursuant to the provisions of Item 1 of Article 27-3, the title shall be set to "AMENDMENT (amendment based upon the provisions of Item 1 of Article 27-3)"; in case an amendment is made pursuant to the order in the provisions of Item 1 of Article 28, the title shall be set to "AMENDMENT (amendment based upon the order in the provisions of Item 1 of Article 28)"; in case a magnetic disk is submitted pursuant to the provisions of Item 3 of Article 50-3, the title shall be set to "SUBMISSION OF MAGNETIC DISK Based Upon the Provisions of Item 3 of Article 50-3"; in case a magnetic disk is submitted pursuant to the order in the provisions of Item 5 of Article 50-3, the title shall be set to "SUBMISSION OF MAGNETIC DISK Based upon the Order in the Provisions of Item 3 of Article 50-3"; in case a document describing the sequence listing is submitted pursuant to the order in the provisions of Item 5 of Article 50-3, the title shall be set to "SUBMISSION OF DOCUMENT DESCRIBING SEQUENCE LISTING Based upon the Order in the Provisions of Item 5 of Article 50-3"; and in case an amendment is made pursuant to the order in the provisions of Item 8 of Article 50-3, the title shall be set to "AMENDMENT (amendment based upon the order in the provisions of Item 8 of Article 50-3)".
2. If an examiner of the Patent Office has given an opportunity for submitting a written reply or its amendment, the reply or the amendment shall be submitted to said examiner of the Patent Office, and it shall be submitted to the Commissioner of the Patent Office for any other cases.
3. In the column "Object of Amendment," the name of the document to be amended and the passage to be amended shall be described in such a manner as "Request II, Column of Applicant."
4. In the column "Contents of Amendment," "as per an accompanying sheet" shall be described and the matters to be amended shall be pointed out, and a replacement paper sheet for the amendment shall be appended. However, where the whole of the paper sheet is deleted as a result of the amendment, where the amendment is made pursuant to the order in the provisions of Article 6 of the Patent Law, Item 2 of Article 1 of the Patent Law Enforcement Order, Item 1 of Article 28 or Item 8 of Article 50-33, or where the amendment is made pursuant to the provisions of Item 1 of Article 27-3, there is no need to use a replacement paper sheet if the matters related to the amendment can be easily re-written in the original text. Where a replacement paper sheet for an amendment provided for in Article 11 of the Patent Law is appended, and the matter related to the amendment is a deletion or an addition of only a part of a passage or a minor correction, the amendment may be made in the copy of the written amendment that has been submitted before instead of using a replacement paper sheet provided it does not affect the neatness and direct copying of the paper sheet.
5. When the scope of claims is amended, a replacement paper sheet

describing the scope of claims related to said amendment as follows shall be appended.

- a) When a new item is added to the scope of claims, the number given to the last item of the scope of claims before being amended shall be described before the item to be added in such a manner as "○ (added)."
 - b) When any item of the scope of claims is deleted, the number given to the item of the scope of claims to be deleted shall be described in such a manner as "○ (deleted)."
 - c) When the scope of claims is amended without increasing or decreasing the number of items of the scope of claims, the same number as that for the item of the scope of claims before being amended shall be given to the amended item of the scope of claims in such a manner as "○ after being amended."
6. When a magnetic disk is submitted pursuant to the provisions of Item 3 of Article 30-3 or when a magnetic disk is submitted pursuant to the order in the provisions of Item 5 of Article 60-3, descriptions shall be made as follows.
- a) In the column "7. List of Attached Documents," the following items shall be described.
 5. List of Attached Documents
 - (1) Magnetic disk that records code data concerning sequence listing: 1 piece
 - (2) Statement: 1 copy
 - (3) Document describing information about the recording method, etc. of a magnetic disk: 1 copy
 - b) In principle, the "Statement" shall be prepared pursuant to the sample shown below. The item "Indication of International Application" shall be described pursuant to Remark 15 described hereunder.

(Sample)

STATEMENT

To: the Commissioner of the Patent Office

I hereby declare that the base sequence and amino acid sequence recorded in the magnetic disk attached to this document have faithfully encoded the base sequence and amino acid sequence described in the specification without making any change of the contents.

Day month, year

Indication of International Application

Title of the Invention

Applicant or Agent
 - c) "Document describing information about the recording method, etc. of a magnetic disk" shall be made, in principle, by providing and describing such items as "Name of Applicant," "Name of Agent," "Indication of International Application," "Title of the Invention," "Character Code Used," "Name of a File Recording the Sequence," and "Person to be Contacted (phone number and name of the person in charge)."
 - d) Columns "5. Object of Amendment" and "6. Contents of Amendment" shall not be provided.
7. When a document describing the sequence listing pursuant to the order in the provisions of Item 5 of Article 60-3, the following item shall be described in the column "7. List of Attached Documents," and columns "5. Object of Amendment" and "6. Contents of Amendment" shall not be provided.
5. List of Attached Documents
- (1) Document describing the sequence listing: 1 copy
8. The paper sheet used is set to Row A, No. 4 (horizontal writing 21cm, 29.7cm) of the Japanese Industrial Standards; only one side of a flexible, strong, smooth, lusterless, and durable paper sheet with no fold is used with its shorter side at the top; and unnecessary characters, signs, frame lines, ruled lines, etc. shall not be written on this paper.
9. The paper shall be free of creases and tears.
10. Margins shall be set to at least 2cm at the upper edge, the right edge, and the bottom edge of the paper sheet, and 2.5cm at the left edge. In principle, the margins shall not exceed 4cm at the upper edge and the left edge, or 3cm at the right edge and the bottom edge. In these cases, the margins are left completely blank. The document number (provided it is described in the request) may be added in the margin corner of the upper edge and within 1.5cm of the upper edge.
11. The written amendment shall be a typed or printed manuscript so that an arbitrary number of copies may be directly made by photograph, electrostatic method, photographic offset, or microfilm.
12. In all the paper sheets of the written amendment, serial numbers starting from 1 in Arabic numerals shall be added in the center of the top or bottom edge of the paper sheet (except for the margin parts).
13. In cases of a typed manuscript, the space between the lines shall be set to

at least 5mm. In case of using Roman letters in Remarks 11 and 14, the width shall be set to 1.5 letters.

14. Items mentioned shall be written in characters of No. 4 type (Roman letters used for Remarks 11 and 14 are set to not less than 0.21cm in height in capital letters), wherein the color used shall be dark and non-fading, and the characters shall fulfill the requirements prescribed in Remark 9.
15. In the column "Indication of International Application," where an applicant has already received the notification of the international application number from the Patent Office, the number shall be described in such a manner as "PCT/JP ○○○○/○○○○○○," where the applicant has not yet received the notification of the international application number, the date of submitting the international application shall be described in the order of date, month and year in such a manner as "international application submitted on ○○.○○.○○○○", and the document number (provided it is described in the request) shall be also described therein.
16. The "Name of Applicant" shall be described as the full name in the order of family name and first name in the case of an individual person; in the case of a juridical body, the name shall be described.
17. The "Address" shall be described in detail such as "Japan, prefecture, county, village, major article, minor article, plot number, and house number" and the postal code shall be also stated.
18. The transliteration of the name and the address of the applicant or their translation into English shall be also added thereto using Roman letters.
19. In the column "Nationality," the name of the country of the applicant or the representative shall be described.
20. In the column "Address," the name of the country of the applicant or the representative shall be described.
21. In the case of describing the name of a country, the name of the country designated by the Commissioner shall be written in Japanese and English.
22. In the column "Representative," the name of the representative shall be described and the applicable one from among "lawyer," "patent attorney," and "legal representative" shall be described before the name of the representative.
23. Where a representative is stated, the seal of the applicant is not necessary; if there is no representative, the column "Representative" need not be provided.
24. In each paper sheet, erasure, correction, overwriting, and inserted lines are not permitted in principle.
25. The paper sheets for the written reply shall be filed with, for example, a clip so as to be easily separated or re-filed.
26. In the "Address," only one address of each applicant, representative, attorney, or sub-attorney shall be described.
27. In the column "Sub-Attorney," the name of the sub-attorney shall be described and the applicable name from among "lawyer" or "patent attorney" shall be described before the name of the sub-attorney.
28. Where a sub-attorney is stated, the seal of an attorney is not necessary; if there is no sub-attorney, the column "Sub-attorney" need not be provided.
29. The Christian Era or Gregorian Calendar shall be used for the date. Figures of the day, figures of the month, and last two figures of the year shall be expressed in Arabic numerals respectively in this order, and a period shall be added after the figures of the day and the month (for example, March 30th, 2004 shall be written as "30.03.2004"). When using another era or calendar, the Christian Era or Gregorian Calendar shall be added thereto.

Form 15bis (Related to Article 31)

CORRECTION(AMENDMENT)

To: Commissioner of the Patent Office

(To : Examiner of the Patent Office)

1. Identification of International Application

2. Applicant (Common Representative)

Name: Signature _____ (印)

Address:

Country of nationality:

Country of residence:

3. Agent

Name: Signature _____ (印)

Address:

4. Date of Invitation

5. Item to be Corrected(Amended)

6. Subject Matter of Correction(Amendment)

7. List of Attached Documents